Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

THE SPIRIT OF RESEARCH

I. The Four Types of Research

IN THE FAR SOUTHWEST lies a valley between two mountain chains. On the eastern side the mountains range from ten thousand feet down. At the north rise rather precipitously from the floor of the valley a number of granite peaks, conspicuous from its whole length. Mountain springs furnish brooks, which slowly vanish as they drop lower and lower down the thirsty canyons. Farther south the eastern wall is harsh and cut by deep erosions as the waters of the summer deluges of the centuries have gnawed away at their steep slopes. Two porphyry peaks rise abruptly, standing like Indian sentinels to warn the valley of approaching danger. Still farther south, the range becomes more massive, rises sharply in ragged pyramids that rest on a broad, sweeping base, where the tall yellow pine grows. At the extreme southern end of the chain the peaks become more rounded and are of quartzite. The chain that bounds the western side of the valley starts at the north in an extensive line of cliffs and jagged edges, granite and quartzite masses. It sinks into a low line of hills, and then rises again abruptly into a wall of upturned quartzite and marble, which the hand of Time has built into castles, towers, and fortifications of exceptional sharpness of outline. Farther south, the chain becomes a series of massive rounded mountains, containing many rich veins of copper ores.

The valley itself is of easy slopes, over which run the flood waters from the bordering walls and their canyons, but no river carries these waters back to the sea, as the valley is greedy for all the water it receives. The slopes are stream-built, and the entire valley is filled for thousands of feet with the débris of ages. A characteristic feature is the presence of many rounded buttes, standing like islands in the middle part, an archipelago of survivors, not yet completely buried, of the original igneous hills. The history starts with the Pre-Cambrian sedimentation, deformation, volcanism, and metamorphism, followed by erosion. In the Paleozoic time, the limestones were formed under the sea, shortly afterward were elevated, and with all the other strata were folded and crumpled like a handful of waste-paper. A dip to the south allowed the sea again to wear away the land for a short time. Since the beginning of the Quarternary period, the valley has filled up with the wash of the torrential rains, the conquests of the fierce charges of the wind, the wave-driven sands of a salt lake, while even underneath, the material has been re-deposited by underground channels.

Growing in isolated patches is the thorny mesquite, in others the cat's-claw, the grease-wood, the sage-brush. All are used to hard conditions, and can survive for many long weeks without water save such as may be in the slight humidity of the air. The ocatilla spreads its slender whips to the sky, tipped with scarlet. The kallstroemia and the evolvulus grow in profuse masses amidst the stretches of gramma grass, sacaton grass, galleta grass. Even on the edges of the alkali lake, lying torpid under the blazing sun, may be found saltbushes, which can exist under most adverse conditions.

In the shadows of the bushes hide the jack-rabbit, the small burrowing animals of the desert, the diamond-backed rattler, and various bronze and silver lizards. The cactuswren and song-sparrow flit about in search of food. Overhead wheel buzzards in search of victims of drought and starvation. Tall century-plants spread their honey-laden arms, and many forms of yucca and agave attract birds and insects. Under the stones hide centipedes and scorpions, and in the twilight the skulking shadow of the coyote glides silently through the landscape. In the canyons are forest-trees where the mocking-bird pours out his concert, while the flash of the Baltimore oriole lights the somber green. The crested quail with wary eye for fox and snake guards her young under the live-oaks, and high up in the indigo blue floats a solitary eagle.

In the depths of the mountains the metallurgist finds ores of gold, silver, copper, and lead. The tall smelter stacks evidence the activity due to these. In springs near some of the buttes, sulphur is a constituent, furnishing a name for the valley. The chemist finds in the soil and particularly in the alkali lake the chlorides, sulphates, and carbonates of potassium and sodium, and also salts of calcium and magnesium. The valley is even charted to show the amounts of these in the soil. The rise and fall of the ground-waters is a problem for the physicist. The drifting effect of the wind on the contours is a problem in mechanics. For the biologist there are other problems, for life exists here under hard conditions. Over a tract of fifty square miles there is practically no life at all, and few forms exist in the inhospitable and bitter waters of the lake. The valley is one of the spots where Nature intended to be alone.

This brief sketch indicates what scientific research is interested in when it studies the valley. A complete account would be quite voluminous. But it would not exhaust the description of the valley. There are other types of research as fundamental as that of science. There is for instance the mathematical. The flowing profiles of exponential curves sweep down the stream-built slopes from the mountains. The helicoidal curves of vortices of dust that rise from the valley to the sky every hot summer day, wind their spirals in whirls that widen asymptotically upwards. The shimmering plane of the alkali lake reflects the distant mountain surfaces. These surfaces are bent and twisted like oriental rugs flung carelessly down. Edges of regression of developables, parabolic lines, hyperboloidal passes, pinch-points, conical points, nodal lines, the entire array of the geometry of surfaces, may be found in these deeply eroded, volcanic slopes, and jagged peaks. Fan-shaped draws spread out at the bases of canyons where they discharge their waters, and steep-walled arroyos break the continuity. The lines of level of old ocean shores, and of modern lake beaches can be discerned. In places, the cusps of the drifted sand-dunes limit the curves drawn by the fingers of the wind. In others, the fine dust lies in sweeping transcendental curves with centers, nodes, foci, fauces, lines of divergence or convergence, every type of curvature—evanescent congruences different every hour, yet all subject to the same differential equations. The wind blows and the shimmering lake breaks up into a thousand curved mirrors held by dancing fairies, but the partial differential equations have designed the ballet. The mountains grind the glittering crystals into finer and finer particles, but the dihedral angles are always the same, and under the laws of groups. All the projective geometry of optics may be studied in the valley atmosphere. Vector analysis sees its curl and divergence, vector lines and congruences every day. The algebra, geometry, and analysis of the valley is a wonderful story.

For a different group of investigators the valley does not consist of geological formations, minerals, chemicals, and strange forms of life, nor of twisted lines and crumpled surfaces. They see the valley as the home of the lean, swarthy Apache. Before long-horned cattle had eaten all the grass, deer lived in the valley; game of many kinds was abundant; the streams furnished enough water for human life; mesquite beans and yucca pods furnished nutriment; the cactus furnished fruit; the maguey, dessert. The cougar and the coyote gave their skins, and birds their feathers. Stones furnished tips for his arrows, the sinews of the deer his cords. He lived continually outdoors, and could travel a hundred miles in a day, with no food, little water, and under a blazing sun, whose blue-white rays scorched his naked body. He climbed to the very tops of the impossible crags, for thence he could see the entire valley. His moccasined feet clung to the most precarious footing, and the grip of his lean hands was steel. When he lay down he melted into the ochre soil as if he could become invisible. He wove baskets from the grasses and other fibres, to hold his scant supplies, to carry water, and for other purposes. He knew the value of all the desert plants. On the mountain tops grew the laurel, whose leaves made men lose their minds. He knew where to find the cat-tail in the cienagas, with its sacred yellow pollen, with which he made his worship of the sun and moon. He carried a little deer-skin bag everywhere to hold this marvelous powder, for performing his rites in hunting, sickness, in spells, and all the affairs of life.

Lean and wiry, a function of the desert and the peak, of the sun and the wind, the lightning and the cloud, tireless, abstemious, leading a life which had little humor or gaiety, facing the stern and pitiless vicissitudes of the valley, he became like the country itself. He had no grudge against the wild growths from which he wrested his sustenance, for he loved this land of burning sun and little rain. To him it was Chiricahua—the Beautiful. In return the land loved him and his grim mother always placed something within reach to maintain life. He lived in small groups, never in towns or villages, since there was rarely enough in any one place to feed a large village. In consequence, he became solitary, taciturn, hiding his feelings tightly from everybody but the sun and moon, unless in the grip of some terrible calamity he held his spirit-dance to implore the gods for mercy and compassion.

After many centuries came invaders, tanned warriors from the south, with death-dealing fire-arms, mounted on horses, dressed in mail, a motley horde of warriors, adventurers, and priests. Some hunted gold, always chasing the end of the rainbow, some looked for excitement, some for new lands for the king, some to rescue the heathen from everlasting fire, even at the cost of his life. The years flowed along, there came more of the swaggering race, and a fight began for existence on one side and extermination on the other. The Apache began to hunt the Spaniard as he had hunted the deer, the cougar, and the coyote. All his cunning gained a new quality, all his harsh nature became more cruel, all his intelligence began to center on one aim, self-preservation. He knew that his mountain fastness, caves, inaccessible crags, huge bowlders, and obliterated trails were his only friends. The prickly cactus, the entangling cat's-claw, terrible cholla, stinging ant, the rattler, the centipede, the dazzling sun and dry water-courses, fought for him. He burned mission churches, slew men, women, and children, tortured to death all captives as a warning to others to stay out. Then came the pale-faced Anglo-Saxon. Although a few desperate struggles insured him the valley for a few years, the game was gone, the old life was impossible, and he was scattered on many reservations. Here he acquired new traits, still a function of his conditions, and his neighbors.

The valley is far from being exhausted, however, and another type of research presents it from a totally different aspect. These investigators are not hunting for the structures and laws of science or mathematics; nor for the functional inter-relations of a people and its environment. They have in view a more intangible structure, more subtle laws. For them the colors laid on the long wrinkled slopes by the sun and the air, the ethereal ocean in which float the crags and domes, mean more than all the quartzite, porphyry, and granite, or the copper, gold, and silver ledges. The orange and cardinal cups, the little blue stars that shine among the dainty black feathers poised delicately on hair-like stems, mean more than classifications as Kallstroemia, Evolvulus, or Gramma. The lithe, slender, gracefully irregular whips, tipped with a scarlet flame, are more than Ocatilla. Against the western sky the serrated wall becomes a chief's war-bonnet of eagle feathers. The outline of the eastern wall is a perfect profile of the great Apache leader, sleeping on his own mountain chain, a mammoth statue wrought by his mother, the earth. His stern face is ironic as the new race tries to put fetters of civilization on this untamed wild creature, the desert. He might almost be thought to smile, when the mirage paints lakes, trees, shade and habitations, to lure the unwary newcomer to barren land, drought, burning heat and death. The epic of this vanished people is a research of different order from those mentioned above, but it is as much a part of the valley as the physics, chemistry, mathematics, and anthropology.

There are other artistic features besides the poetic. For when the painter sees the sun-washed surfaces of the Galiura mountains, with their translucent purple, heliotrope, lilac, amethyst, violet, and ultramarine; the ochre, saffron, gold, burnt gold, salmon, glowing orange, and scarlet; the ghostly beryl, the spirit emerald, the turquoise green, all the play of delicate color that cannot be named, making the mountain walls look like the vari-colored petals of some blossom created by the magic of a genie, he sees a living beauty behind these silken veils, and paints a canvas which is the record of his researches. When he sees the long sunset shadows creep across the valley floor with its oriental carpets, bringing out the rose and violet of some scraggly yucca as it stands out against the indigo sky, while the distant mountains fade into pale aquamarine tints like dreams that steal away in the gathering twilight, his record contains a truth as great as any that may be written about the ores under the hill-tops. When he catches the dance of the sand-devil whirling in the arms of the hot wind, he puts the passion of this burning land on his canvas.

And the musician sits enraptured while the mocking-bird pours out his heart in an ecstacy of joy, and reports his research later in symphonic poems of great beauty. He will catch the elusive motif of the mountain-brook, the faint rustling of the moonlight on the grass. Even the alkali lake, tossed by the wind, beats a rythmic melody on its sands, and the long mathematical curls hold a faint harmony for him that hath ears.

The architect that built these towers and castles, spires, domes, and minarets, knew more than five orders, and left them on record for coming artists to copy. The statues sculptured by the elements have their own curves of beauty, and they will stand there for ages and ages.

The valley is filled with material for the research of the artist as it is for the anthropologist, the scientist, or the mathematician. And when we would comprehend the world in its entirety, we cannot neglect any of the results of any type of research. The world is an indivisible unit, not a parcel made up of laws and facts from science, anthropology, mathematics, or art. Each of these has a view which is only partial. Each is attentive only to certain features, and the real world is far more than their fragmentary pictures of it.

Whether it be the Mathematician playing with his ideal geometries, algebras, and logics; the Artist in his warmer world of Aesthetics and Aspirations; the Anthropologist studying Man as interwoven with the World; or the Scientist who probes deep for eternal Laws; all are engaged in Research. For what is Research? It is more than the determination of a vapor-pressure, the calculation of a new function-table, or the study of some new-found pottery. It is the "passionate and disinterested curiosity of the human intelligence" (Picard). It is the young eagle trying his wings. The Universe has no terrors for Research. Its world contains the stern clutch of the polar cold, the burning languor of the tropics, the unclean leper, the black death, the vilest diseases, the most dangerous gases, the most violent explosives, the lightning's shafts, the sun's javelins, the depths of the South Sea, the heights of Mt. Everest, the fang of the snake, the sleep of the anesthetic, the hypnotic trance, the ravings of the insane. Alike for it are the wilderness, the city, the slum, the palace, the jail, the saint, the sinner. Research hunts for order, for beauty in the world, for imperturbable law, for the cloud-forms of Time, in nature, in man, in life, in death, in human woe and tears, or human joy and elation. Research holds nothing sacred. It looks for the origin of Man, of the World, of Religion, of God, of Institutions, of Society, of State, of Church, of Man's relations to Man, of Man's relation to Woman. It does not shrink from any depth, nor is it dizzy at any height. Research is not even content with what it finds, but would fain be a Creator, and make new worlds, new beauties, new loves, new hates, new passions, new things, new animals, new men, and new women.

Research is not only passionate and disinterested, it is audacious, ambitious, fearless. It has for its invocation:

> "Eastward, where the Sun is kindled;
> Northward, Cave where the Wind sleeps in Darkness;
> Southward, Swamp where the Snake-Mist rises;
> Westward, Plain where the Ghost-Trail goes."

Its benediction is:

> "I bow myself to the Quarters,
> I salute the Sun and Earth, my parents,
> Once more the Song has gone forth,
> Like smoke it has vanished in the Sunlight."
> —(John Gould Fletcher.)

II. SCIENTIFIC RESEARCH

Scientific research has for its object the statement of laws. This is the same as saying that Science searches for what it considers to be uniformities in human experience. It hunts for the everlasting hills that hold up the four corners of the sky. It experiments over and over on like materials to ascertain if the same results follow. It analyzes the situation in every experiment and tries to ascertain what elements are necessary, what accidental. It endeavors to reduce dependence to a numerical statement, that is, it tries to base its conclusions on measurement. Of course, much of its present content is not altogether so based, perhaps never can be so based, but the attempt is made to reduce all data to numerical form. Science endeavors to be impersonal, to resort to self-registering apparatus, to the camera instead of the eye, to machines that draw their own graphs. Its first aim is a perfectly accurate record of the objective facts.

The facts determined beyond all question of error, self-deception, omission, or imagination, the next problem is to find the laws they imply. This is done first for the obvious connections between phenomena, then as the number increases they are synthetised into more general laws, and these with the assistance of fortunate hypotheses are included in more general statements, the whole: facts, laws, and hypotheses, ultimately constituting a Theory. The theory of celestial mechanics, or theory of electromagnetics, or theory of relativity, or theory of evolution are instances.

Science searches for the Invariants of the world. It desires to discover the permanent in the flowing stream of experience. It dreams of eternal verities, of a stable, essential structure of the universe, which is not subject to the vicissitudes of chance. Science does not find nor expect to find the capricious, the spontaneous, the free, the spiritual, for it assumes as its subject matter that which is determined. Given the state of the universe at a given instant, its history up to that instant, and the hope of Science is to be able to say what any succeeding state of the universe would be. Science sits patiently unraveling the most tangled threads that the web of phenomena produce, never tiring, never retrograding. Its hypotheses may give way to new ones, and its theories may be included in more satisfactory ones, but the essential results of Science are permanent, and it keeps what it gains. It saves the infant from death, the child from disease and malnutrition, the youth from dangerous ignorance, the adult from premature decay. It corrects educational systems, reduces drudgery, multiplies the yield for labor, increases the time for leisure, removes fear from the world. It gives humanity power over its surroundings, enhances comfort and well-being. It gives more time for reflection. It guarantees progressive evolution of the race. It gives Life and Life more abundantly.

This is a Golden Age for Scientific Research. Thousands are searching the heavens, the earth, the waters, and the waters under the earth, for jewels, small or large, with which to adorn the crown of Science. Since the time of Descartes—the founder of modern science—and his injunction to see, and to see more clearly, the votaries of Science have spread over the earth, examining the microscopic, the telescopic, every nook and cranny of the earth, investigating patiently and thoroughly what they found. Science is a Supreme Court of Last Appeal, in all questions of Natural Law and Invariancy, for it is simply the Human Mind perceiving these things with clear, unobstructed, sharply defined, immediate vision.

III. MATHEMATICAL RESEARCH

When Kepler worked out his famous laws from observations he was doing scientific research. When Newton investigated the meaning of the laws he was engaged in mathematical research. The law of equal areas meant to him a central force. The elliptical orbits of the planets meant that the force varied as the square of the distance. The proportionality between the cubes of the distances and the squares of the periods meant the sway of this force extended to the confines of the solar system. By a flash of intuition he saw it also acting to the ends of the universe, and announced his law of gravitation. This was mathematical research.

Cayley looked at the diagrams of chains of atoms in organic molecules, and they became the theory of chemical "trees." The facets of crystals may all be found from the position of a single one by the laws of groups. The lines of descendants from living beings are threaded with the hereditary characteristics under the laws of combinations and averages. Statistics cannot lie when stretched on frequency curves and surfaces. The miniature solar systems in atoms are mathematical structures. Mathematical research permeates all these.

When Faraday filled space with quivering lines of force, he was bringing mathematics into electricity. When Maxwell stated his famous laws about the electromagnetic field it was mathematics. The relativity theory of Einstein which makes gravity a fiction, and reduces the mechanics of the universe to geometry, is mathematical research. Wherever a hypothesis is set up and conclusions deduced from it, mathematics is at work. Wherever the scientist goes beyond his observed facts, introducing concepts such as energy, field, propagation of a state, line of force, action at a distance, action in a continuous medium, he is becoming a mathematician. Mathematics is a fundamental mode of thinking, impossible to evade.

Mathematics concerns itself with an ideal world of forms and relations. It constructs new worlds and studies their properties. It undertakes to draw all the necessary conclusions from given data and to point out what other propositions are consistent with the given data. It is not primarily concerned with the applicability of its worlds to that of everyday experience. But so far as this experience can be idealized, divested of its accidental features or its individual properties, mathematics includes the sublimated product among all the other more ethereal creations of its own. It has been defined as the Theory of Pure Forms, in which is meant to be included all the relations and properties of the forms. However, if so defined, it must be understood that the forms are sometimes made of flowing substance, and may in some sense become other forms, while yet retaining their essential properties. Although the definition is inadequate, it is yet quite useful in getting a view of the rôle of Mathematics as one type of Research. Mathematical research is the study of the Universal in the world. It endeavors to find the hidden spirit whose manifestations are numerous, but yet which is One despite its Protean character. It is impersonal, unemotional, not influenced by love or hate, joy or tears. Its worlds are eternal, even though they change like clouds of smoke in the wilful wind. Its additions to human thought are permanent, never decay, never explode, never give way to others. It verifies laws, it destroys laws. It marks the boundaries of the realms in which theories may reign, it destroys theories. It humbles the arrogance of Logic and Philosophies, it equilibrates the claims of rival factions. It is the Supreme Court of Last Appeal, in all questions of reasoning, not on account of any merit of its own, but because it is after all, nothing but the Human Mind perceiving its own nexus of relations, with clear, unobstructed, sharply defined, immediate, vision.

IV. ANTHROPOLOGICAL RESEARCH

Using the term broadly, Anthropological Research considers Man in every aspect as a function of the World, and the World as a function of Man. For the relation of functionality is symmetric, and if A is a function of B, B is a function of A. Anthropology is not concerned with the general but with the particular, with the human race, a unique product of the world. It studies man's form, structure, anatomy, physiology, neurology; it studies his origin, development, his customs, his traditions, his races, his classes, his societies, his groups, his family, each individual. Anthropology is interested in History and Education. It studies the State, the Church, Cosmopolitanism.

Anthropology is interested in the whole expanse of this tremendous function: Man and his dependence upon many variables. The regular part of the function it calls Civilization. The discontinuities and singularities it calls Revolution and Crises. The late war was a discontinuity in which the infinite ambitions of a few broke the continuity of the function. Anthropology seeks to know the value of this function, whether they all be only finite, or if perchance some may be infinite. It is interested in those ideals toward which man makes an approach but never reaches. It studies his oscillations about positions of equilibrium, his spiral paths, the winding surface of many dimensions which marks the progress of the race, the intersections of civilization with itself; its transition from one level to another. It studies the relations of the development of this function in isolated parts of the earth with those in other parts. It studies man's reaction to his environment, how the sea makes laws of commerce, the mountains create power, the desert spirituality.

But equally it studies the world as function of Man. It is busy with the account of his inventions, of his increasing control over all the forces of Nature, of his adaptation of the world to his own comfort and better development. It studies the evolution of custom, of law, of order, of government, of the numerous compromises by which Man gains, inch by inch, a greater control over his environment. Sociology, Economics, Political Science, are merely names for some of the divisions of this enormous branch of human activity. For Civilization is a creation, it is not a product of nature.

There have always been investigators of this part of human experience, for mankind is interested in studying man. The first thinker, the first seer, the first priest, the first story-teller, must have had for his daily thought the question: How did I get into this world, and what is my relation to it? Many of the keenest minds today are studying this, the Great Function.

Anthropology has had its hypotheses. Read Plato's Republic, More's Utopia, Well's History, Buckle's History of Civilization. Read the History of Philosophy, of Art, of Mathematics, of Science, of Human Thought. Anthropology has witnessed many tremendous experiments, for they last for centuries. Experiments have been made in social schemes, in religious schemes, in schemes for the family, many inventions besides those of material things. Slavery was an invention, and experimented with. Marriage is an invention, and experimented with. The Church is an invention and experimented with. The State is an invention, and its experiments have been calamitous. Law is an invention, and has evolved into what we have today. Socialism and Bolshevism, Conservatism and Radicalism, are inventions that are continually under experiment. The discoveries for the race have been numerous. The pages of History are eloquent with functional theorems: "The wages of sin is death!", "Persecution encourages a cause!", "Man develops immunity to some poisons, but is anaphyllactic to others," "The race and the opportunity must fit." Sociology, Political Science, Psychology, Education, Philosophy have all discovered theorems as fundamental as those of Science or Mathematics, but of a different type. Law and Universal Form are one thing, Functionality a different thing, each has its theorems. Anthropology is also a Court of Last Appeal, in all questions that concern the interwoven relations of Man and the World, for it too is the Human Mind observing the past and the future with clear, unobstructed, sharply defined, and immediate vision.

V. ARTISTIC RESEARCH

The Dreamer of dreams is also engaged in Research. He is not, like the Mathematician, looking for the Universal; nor like the Anthropologist, looking for the intertwined threads of the web of Man and the World; nor like the Scientist, searching for the uniformities of human experience; his object is the Romance of the world, the fascinating mystery that lives behind every veil. The Architect's touch makes stone float in air; the Sculptor's pliant fingers mould the invisible forms that are pleading for expression; the Painter's purple light and glowing mountains beckon man to the enchanted lands; the Musician's witchery speaks to the heart from incarnated forms of ethereal life; the Poet uses verse and prose to write the Divine Comedy and the Human Comedy. Each is engaged in research behind the phenomenal screen. Like other investigators the Artist is hunting reality.

He investigates the aspirations of man, his hopes, his desires, his dreams, his visions. His methods are his own. No rigorous reasoning with its fine steel net can catch the cloud-forms of his domain. No balance can weigh the character of Hamlet; no spectroscope can resolve the Ninth Symphony; no electrometer measure the potential in the Descent from the Cross. No Institution of society can imprison the subtle mist that bloweth where it listeth. But just as in Mathematics the imaginary becomes the guide to the common; just as in Anthropology the ideal of liberty, fraternity, and equality, emancipates woman, dethrones czars, educates the slave; so too the reveries of the Artist create new elements of life, give greater sustenance to the wings of the mind, infuse the spirit of man with new daring.

The Artist enunciates truths. They have often startled the race with their subtlety and profundity. Each school of art has seen a new vision, some new expression for these inner forms continually struggling for the right to be born, some new idea of sculpture, painting, music, of literary creation. They are experimented with, refined and finally accepted, just as are truths of mathematics, anthropology, or science. Not that every new creation of art has had its chance, any more than have all the new ideas of scientists, mathematicians, or anthropologists. The mind of man evolves but slowly.

"There was once a little girl, to whom an elderly friend gave a hyacinth bulb. "Little girl," she said, tossing up in her wrinkled hands the bulb, wrapped up in its balloon silks, "little girl, there is enclosed a miracle here; indeed, my child, life, joy, blowing color, perfume shut up in a jealous flask. It is a fine gift, a fairy present. Guard it well!" The little girl adored the hyacinth bulb, said her prayers while looking at it, nursed it like a doll, put it under her pillow at night, kissed it fondly upon waking, even took it out for a walk. But, alas! without water, without earth, without rest, the unhappy bulb withered, without ever permitting a tremor in a little green tongue, which even in the dark cellar it had put out at the face of life, as a matter of principle. And the disappointed little girl one day threw it in the face of the vexed old lady.

"Alas! Man is the child clinging to his hyacinth bulb, and with it withers his dearest desires, his hopes, his dreams." (Gérard D'Houville.)

Art searches for the spiritual, the ideal, the spontaneous, the free, knowing that these are the real, the immortal.

A tear and a laugh mean more to it than an atom, a curve, or an institution. Art also is a Supreme Court of Last Appeal, in all questions of the spontaneity of Man and the World, for it too is the Human Mind perceiving the things of the Spirit with clear, unobstructed, sharply defined, immediate vision.

VI. The Spirit of Research

The Spirit of Research is the aspiring soul of man beating its wings against its limitations. In itself it finds the power of flight, the power of vision, the power of creation. It is not confined to what is in the field of view of a microscope, however minutely accurate. It is never content with the habitation it has built, however convenient the furnishings. It rises on the rarefied air of Mathematics that it may see the more distant horizons; it supports itself on the solid objectivity of Science that it may transmit its creations to posterity; it studies the intricate game of Man versus Nature in order that it may find the paths on which it may go farthest; it utilizes the creations of the Artist as patterns for its own spiritualized creations. Its characteristic is creative life, for it emanates from Life, not from mechanism. What it does is the spontaneous outcome of Activity.

The true scientific research is shown in Newton: "Playing like a boy on the seashore, diverting himself in now and then finding a smoother pebble or prettier shell than ordinary, whilst the great ocean of truth lies all undiscovered before him." It is shown in Poincaré: "Who was willing to work, to suffer, to pay for his seat at the show, in order that he might see, or at least that those who came after him might see." True mathematical research meets the criterion of Emerson: "We do not listen with the best regards to the verses of the man who is only a poet, nor to his problems if only an algebraist; but if a man is at once acquainted with the geometric foundation of things and with their festal splendor, his poetry is exact, and his arithmetic musical." The true anthropological research meets the test of Henry Adams: "History has never regarded itself as a science of statistics. It is the Science of Vital Energy in relation with time; and of late this radiating center of its life has been steadily tending—together with every form of physical and mechanical energy—toward mathematical expression."

The Spirit of Research inspires the mind "to creep from fancy to the fact, and thus find progress, man's distinctive mark" (Browning). The Spirit of Research is like Socrates, who wished to know not only what seemed to be true, but what it meant for the Soul and how far it could carry man on his upward flight. The Spirit of Research is LIFE with its two wings: Intelligence and Sympathy. It is on its forward flight, impelled by the urge of an inner power. It rests but a moment on any crag, however solid; it drinks but an instant at any spring, however fresh; for from the beginning of the World it has had a Vision whose beauty, whose intoxication, whose smile, eternally say: COME.

JAMES BYRNIE SHAW.

UNIVERSITY OF ILLINOIS.